CONTENTS

MAY 1995 VOLUME 130 NUMBER 1

Editorial 1

Tansley Review No. 82

Strategies of arbuscular mycorrhizal fungi when infecting host plants. By PAOLA BONFANTE AND SILVIA PEROTTO 3

Partitioning and flows of ions and nutrients in salt-treated plants of *Leptochloa fusca* L. Kunth I. Cations and chloride. By W. DIETER JESCHKE, SABINE KLAGGES, ANDREA HILPERT, A. SAEED BHATTI AND G. SARWAR 23

Salt tolerance and ion relations of *Salsola kali* L.: differences between ssp. *tragus* (L.) Nyman and ssp. *ruthenica* (Iljin) Soó. By CHRISTINE REIMANN AND SIEGMAR-W. BRECKLE 37

Hydraulic conductivity of concentric root tissues of *Agave deserti* Engelm. under wet and drying conditions. By GRETCHEN B. NORTH AND PARK S. NOBEL 47

Activities of free radical processing enzymes in dry sunflower seeds. By C. REUZEAU AND G. CAVALIE 59

Physical injury, re-crystallization of wax tubes and artefacts: identifying some causes of structural alteration to spruce needle wax. By EDITH BERMADINGER-STABENTHEINER 67

Plant growth and cell division in *Pisum sativum* L. and *Picea sitchensis* (Bong.) Carr. exposed to ozone. By LORRAINE BAMBRIDGE, RONALD MACLEOD AND RALPH HARMER 75

Continuous monitoring of gas exchange in open-top chambers in pollution experiments: methodological aspects. By F.-A. DAUDET AND J. P. CLAUSTRES 81

Responses of white clover to gaseous pollutants and acid mist: implications for setting critical levels and loads. By T. W. ASHENDEN, S. A. BELL AND C. R. RAFAREL 89

Nitrogen allocation in ponderosa pine seedlings exposed to interacting ozone and drought stresses. By PATRICK J. TEMPLE AND GEORGE H. RIECHERS 97

Growth, photosynthesis and carbohydrate utilization in submerged *Scirpus maritimus* L. during spring growth. By O. A. CLEVERING, W. VAN VIERSSEN AND C. W. P. M. BLOM 105

Morphological and molecular variation in natural populations of *Betula*. By D. E. HOWLAND, R. P. OLIVER AND A. J. DAVY 117

Temperature sensitivities of *Festuca arundinacea* Schreb. and *Dactylis glomerata* L. ecotypes. By HOWARD THOMAS AND JOHN L. STODDART 125

Variation in moisture contents between bulk soil and the rhizosheath of wheat (*Triticum aestivum* L. cv. Wembley). By I. M. YOUNG 135

Influence of ecomycorrhizal infection on the rhizosphere pH around roots of maritime pine (*Pinus pinaster* Soland *in* Ait.). By L. RIGOU, E. MIGNARD, C. PLASSARD, J. C. ARVIEU AND J. C. REMY 141

Induction of mycorrhiza-like structures and defence reactions in dual cultures of spruce callus and ectomycorrhizal fungi. By ANKE SIRRENBERG, PETER SALZER AND ACHIM HAGER 149

ERRATUM 157

JUNE 1995 VOLUME 130 NUMBER 2

Leaf development in *Lolium temulentum* L.: photosynthesis in relation to growth and senescence. By ALAN P. GAY AND HOWARD THOMAS 159

Stimulation and inhibition of pine root growth by osmotic stress. By MARIE-BÉATRICE TRIBOULOT, JEREMY PRITCHARD AND DERI TOMOS 169

Microtubule arrays in maize root cells. Interplay between the cytoskeleton, nuclear organization and post-mitotic cellular growth patterns. By F. BALUŠKA, P. W. BARLOW, M. HAUSKRECHT, Š. KUBICA, J. S. PARKER AND D. VOLKMANN 177

Effects of elevated CO_2, water and nutrients on *Picea sitchensis* (Bong.) Carr. seedlings. By JOHN TOWNEND 193

Influence of potassium nutrition on germinability, abscisic acid content and sensitivity of the embryo to abscisic acid in developing seeds of *Sorghum bicolor* (L.) Moench. By R. L. BENECH ARNOLD, M. FENNER AND P. J. EDWARDS 207

Relationships and hybridization between British species of *Polygala*–evidence from isozymes. By ANDREW J. LACK 217

Ozone induction of extensin mRNA in Scots pine, Norway spruce and European beech. By A. SCHNEIDERBAUER, E. BACK, H. SANDERMANN JR. AND D. ERNST 225

Effects of SO_2 on the concentrations of carbohydrates and secondary compounds in Scots pine (*Pinus sylvestris* L.) and Norway spruce (*Picea abies* (L.) Karst.) seedlings. By P. KAINULAINEN, J. K. HOLOPAINEN AND J. OKSANEN 231

The effect of natural and simulated insect herbivory, and leaf age, on the process of infection of *Rumex crispus* L. and *R. obtusifolius* L. by *Uromyces rumicis* (Schum.) Wint. By PAUL E. HATCHER, PETER G. AYRES AND NIGEL D. PAUL 239

Fungal slime and its role in the mycorrhizal amelioration of zinc toxicity to higher plants. By H. J. DENNY AND I. RIDGE 251

Diversity of fungal symbionts in arbuscular mycorrhizas from a natural community. By J. P. CLAPP, J. P. W. YOUNG, J. W. MERRYWEATHER AND A. H. FITTER 259

Attempted isolation and success in the culturing of a broad spectrum of lichen-forming and lichenicolous fungi. By P. D. CRITTENDEN, J. C. DAVID, D. L. HAWKSWORTH AND F. S. CAMPBELL 267

Holocene vegetation history and human impact at Bryn y Castell, Snowdonia, north Wales. By T. M. MIGHALL AND F. M. CHAMBERS 299

REVIEWS 323

JULY 1995 VOLUME 130 NUMBER 3

Attributes of the nitrogen uptake systems of maize (*Zea mays* L.): maximal suppression by exposure to both nitrate and ammonium. By W. A. JACKSON AND R. J. VOLK 327

Structural changes and permeability of ivy (*Hedera helix* L.) leaf cuticles in relation to leaf development and after selective chemical treatments. By M. A. VIOUGEAS, R. ROHR AND A. CHAMEL 337

Changes in quercetin concentration in onion (*Allium cepa* L.) owing to location, growth stage and soil type. By B. S. PATIL, L. K. PIKE AND B. K. HAMILTON 349

Acclimation of tomato to different carbon dioxide concentrations. Relationships between biochemistry and gas exchange during leaf development. By J.-J. VAN OOSTEN, D. WILKINS AND R. T. BESFORD 357

Canopy gas exchange and growth of upland pasture swards in elevated CO_2. By J. WOLFENDEN AND P. J. DIGGLE 369

Regulation of assimilate partitioning in flowering plants of the monopodial orchid *Aranda* Noorah Alsagoff. By P. E. CLIFFORD, H. H. NEO AND C. S. HEW 381

Characterization of acid invertase from the snow mould *Monographella nivalis*: a mesophilic enzyme from a psychrophilic fungus. By ANDREW J. CAIRNS, CATHERINE J. HOWARTH AND CHRISTOPHER J. POLLOCK 391

The structure and function of the vegetative mycelium of ectomycorrhizal plants. V. Foraging behaviour and translocation of nutrients from exploited litter. By GARY D. BENDING AND DAVID J. READ 401

The structure and function of the vegetative mycelium of ectomycorrhizal plants. VI. Activities of nutrient mobilizing enzymes in birch litter colonized by *Paxillus involutus* (Fr.) Fr. By GARY D. BENDING AND DAVID J. READ 411

Identification of ribosomal DNA polymorphisms among and within spores of the Glomales: application to studies on the genetic diversity of arbuscular mycorrhizal fungal communities. By IAN R. SANDERS, MONICA ALT, KATHLEEN GROPPE, THOMAS BOLLER AND ANDRES WIEMKEN 419

Lack of competition between *Frankia* and *Glomus* for infection and colonization of roots of *Casuarina equisetifolia* (L.). By J. SEMPAVALAN, C. T. WHEELER AND J. E. HOOKER 429

Nitrogen supply as a limiting factor determining the sensitivity of *Populus tremuloides* Michx. to ozone stress. By E. J. PELL, J. P. SINN AND C. VINTEN JOHANSEN 437

Sensitivity of seedlings of black cherry (*Prunus serotina* Ehrh.) to ozone in Great Smoky Mountains National Park. I. Exposure–response curves for biomass. By HOWARD S. NEUFELD, E. HENRY LEE, JAMES R. RENFRO, W. DAVID HACKER AND BEN-HUI YU 447

Does CO_2 modify the effect of SO_2 on variegated leaves of *Chlorophytum comosum* (Thunb) Bak? By EWA NIEWIADOMSKA AND ZBIGNIEW MISZALSKI 461

ERRATUM 467

AUGUST 1995 VOLUME 130 NUMBER 4

Tansley Review No. 83

Current trends in studies of long-term plant community dynamics. By J. C. RITCHIE 469

Comparisons of early root cortical senescence between barley cultivars, *Triticum* species and other cereals. By ERLAND LILJEROTH 495

Growth patterns of the lateral roots of young oak (*Quercus robur*) tree seedlings. Relationship with apical diameter. By LOÏC PAGÈS 503

Competition between micro-organisms and roots of barley and sorghum for iron accumulated in the root apoplasm. By NICOLAUS VON WIRÉN, VOLKER RÖMHELD, TAKAYUKI SHIOIRI AND HORST MARSCHNER 511

The location of sucrose synthase in root nodules of white clover. By A. J. GORDON, B. J. THOMAS AND C. L. JAMES 523

Stem and root nodules on the tropical wetland legume *Aeschynomene fluminensis*. By M. F. LOUREIRO, E. K. JAMES, J. I. SPRENT AND A. A. FRANCO 531

Ultrastructure of cortical root cells of *Alnus incana* infected by *Penicillium nodositatum*. By JEANINE SEQUERRA, ANDRÉ CAPELLANO, VIVIENNE GIANINAZZI-PEARSON AND ANDRÉ MOIROUD 545

Effects of nitrogen supply on the seasonal re-mobilization of nitrogen in *Ulex europaeus*. By B. THORNTON, P. MILLARD AND M. R. TYLER 557

Nitrogen, phosphorus and potassium uptake and demand in *Agrostis capillaris*: the influence of elevated CO_2 and nutrient supply. By R. M. NEWBERY, J. WOLFENDEN, T. A. MANSFIELD AND A. F. HARRISON 565

Physiological responses of *Atherosperma moschatum* to day length, night length and photosynthetic photon fluence rate. By T. OLESEN 575

Gas exchange rates and chlorophyll content of epi- and endolithic lichens from the Trieste Karst (NE Italy). By M. TRETIACH AND M. PECCHIARI 585